F-1

Lone Star's Expansion of Seattle Plant

BY WALTER E. TRAUFFER

(*reprinted from PIT AND QUARRY July, 1970*)

P & Q ON-THE-SPOT REPORT

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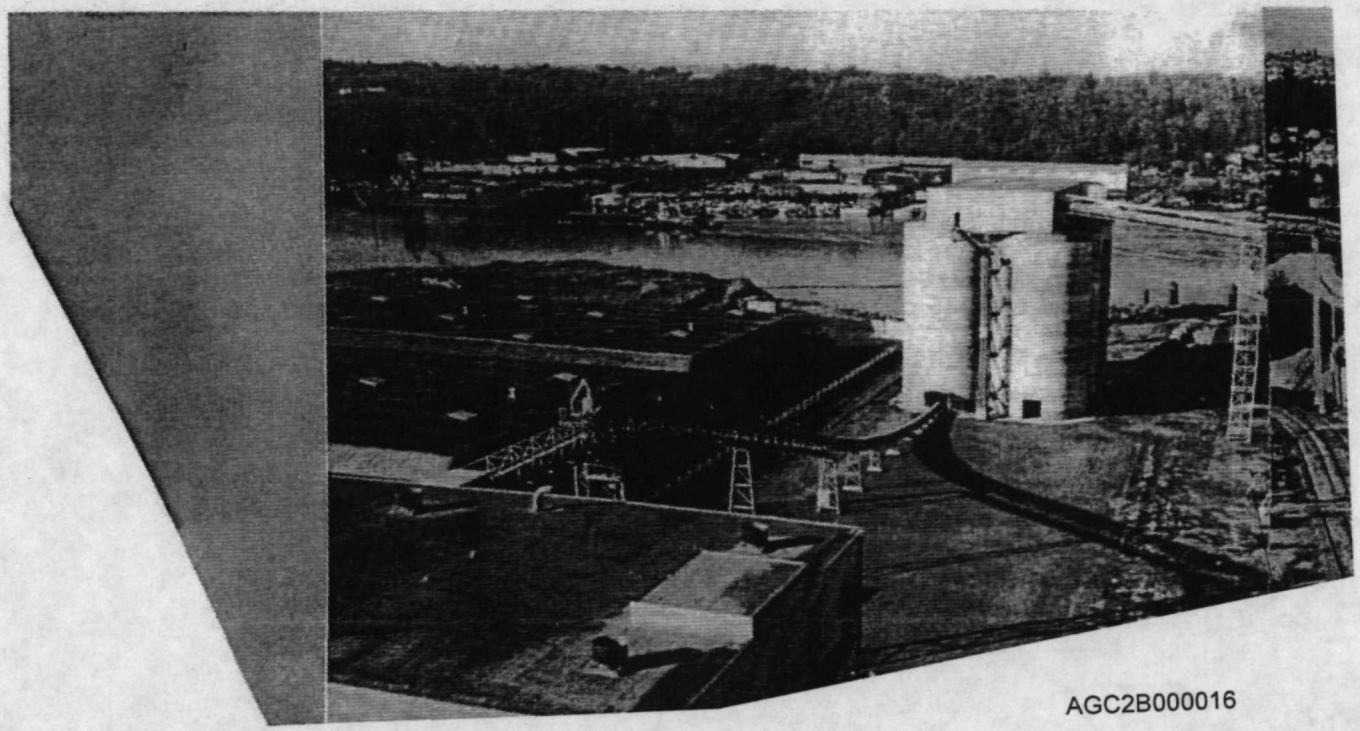

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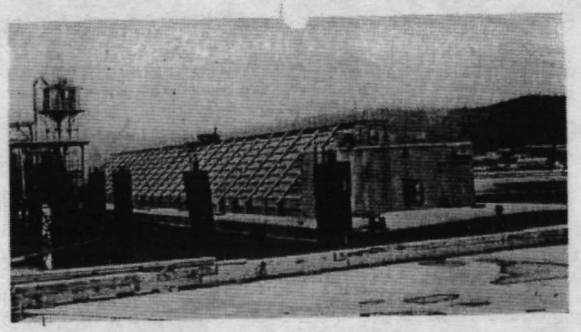
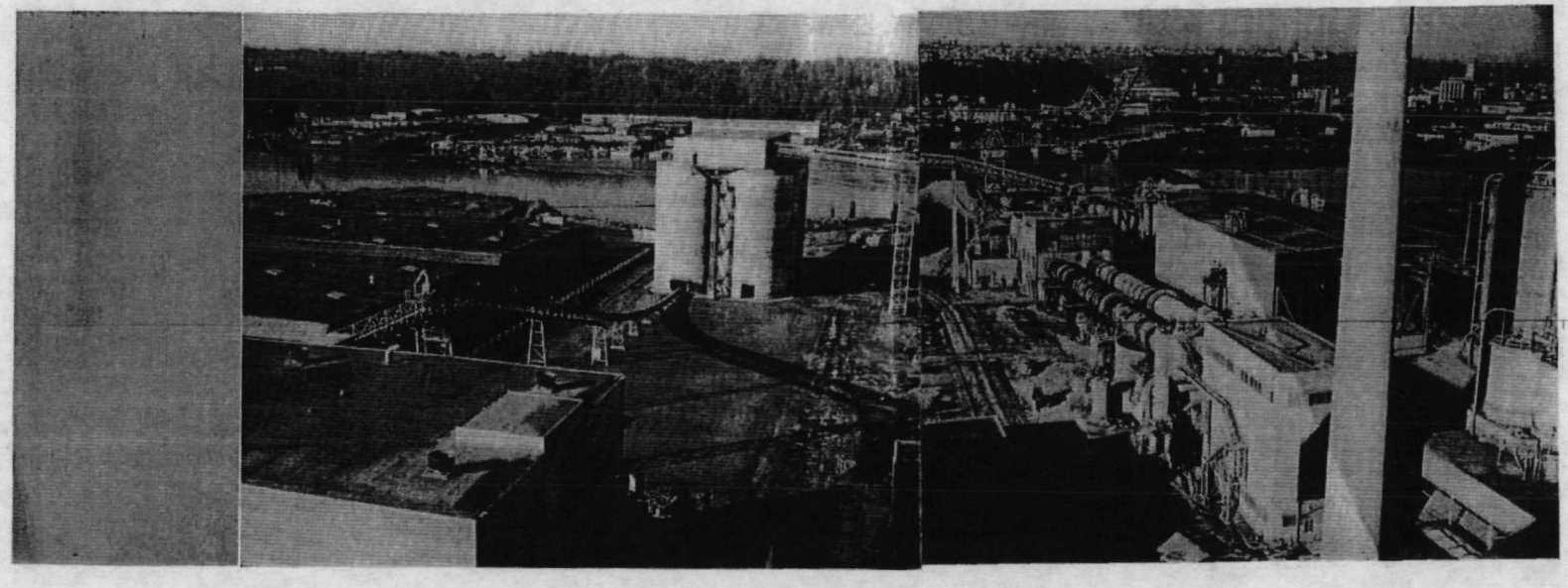
It was part of the original plan to make provision for a new kiln at a future date, and meanwhile to contract for supplementary supplies of cement clinker. The latter would be manufactured to Lone Star specifications, using Lone Star raw material, at the plant of Lafarge Cement of North America Ltd. at Richmond, near Vancouver, B. C.

Both the Lafarge plant and the Seattle plant have for some years been supplied with limestone from Lone Star's quarry on Texada Island. A special barge was built to haul the clinker, and this is now hauling sand and gravel on the return trip to Vancouver.

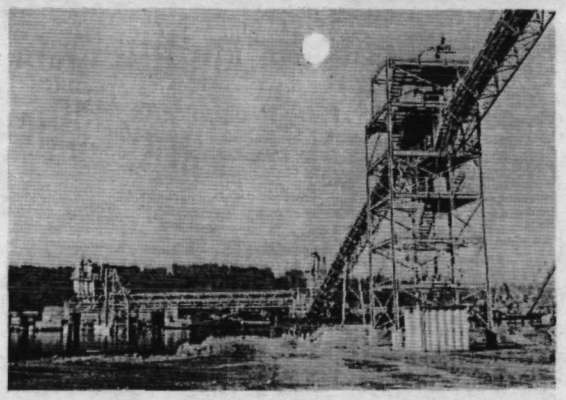
The limestone for the Seattle kilns was, and still is, being barged in about 200 miles from Lone Star's quarry on Texada Island in British Columbia. The 5,000-ton open barges are unloaded by a Colby hammerhead crane with a 100' boom and a 13-ton clamshell bucket. This is on rails, and a turntable makes it possible to move away from the dock and between the kilns to the materials storage building. A transverse track also



At right: The new 28,000-bbl. barge which hauls clinker 100 mi. to the plant from the Vancouver area.



Panoramic view of Lone Star's Seattle plant from the top of the new cement storage silos. From left to right are the new clinker mill and silos, the old dock and crane, and the older cement plant with storage building, silos, etc.



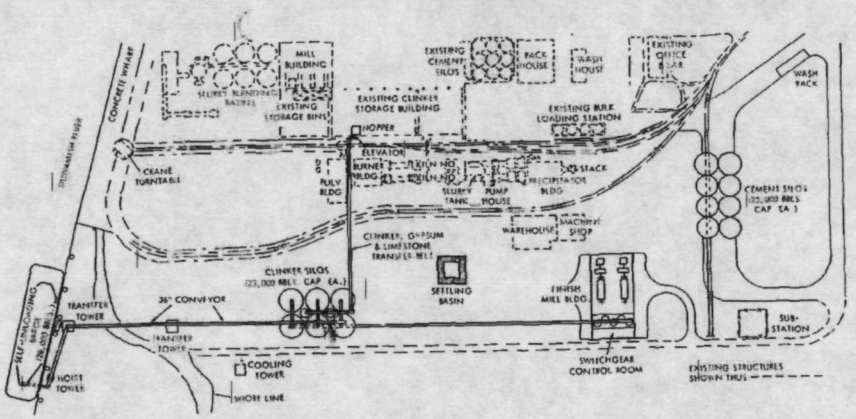
The new dock and barge unloading facilities for clinker.

makes it possible to use the crane for servicing the kilns and other equipment, and for rehandling materials, including stone, iron ore, silica, and gypsum, to open storage or to the reclaiming system.

The 4" to ¾" rock goes to a 4¼' Symons cone crusher and is then fed with other materials to two of the three 7'x 45' Traylor mills. One of these was a swing mill and was converted to raw. The third (finish) mill is now used for masonry cement. The slurry goes to six basins and is blended and pumped to the feed tanks of the two 11' 6" x 240' Traylor rotary kilns, which are connected to a Western Precipitation electrical precipitator. The clinker goes to 9' x 90' rotary coolers, and drag chain conveyors carry it to the storage building. A 9-ton Milwaukee bridge crane reclaims the clinker to a hopper, and an elevator and belt conveyors carry it to the new silos.

The old cement storage silos, the packhouse, bulk loadout system, etc., are still used.

The barge L'Etoile, which was built especially for this service, went into operation in March, 1969. It is of all-steel construction with 54 small hoppers in three rows feeding to collecting conveyors through remote-controlled hydraulic gates, and a radial conveyor connecting to the dock. After delivering a load of clinker at Seattle, the barge stops by the new sand and gravel plant of the Pioneer Sand & Gravel Co. subsidiary of Lone Star at Steilacoom, Wash., to pick up a load of aggregates for the return trip. Capacity is 28,000 bbl. of clinker or 5,500 tons of aggregates. A ratemeter, used to control loading and unloading, makes it possible to carry several different sizes of aggregates. At each changeover the barge is washed out to the bilge. The 100-mile trip from Vancouver to the cement plant takes 24 hr., and the return trip from Steilacoom is 4 hr. longer.

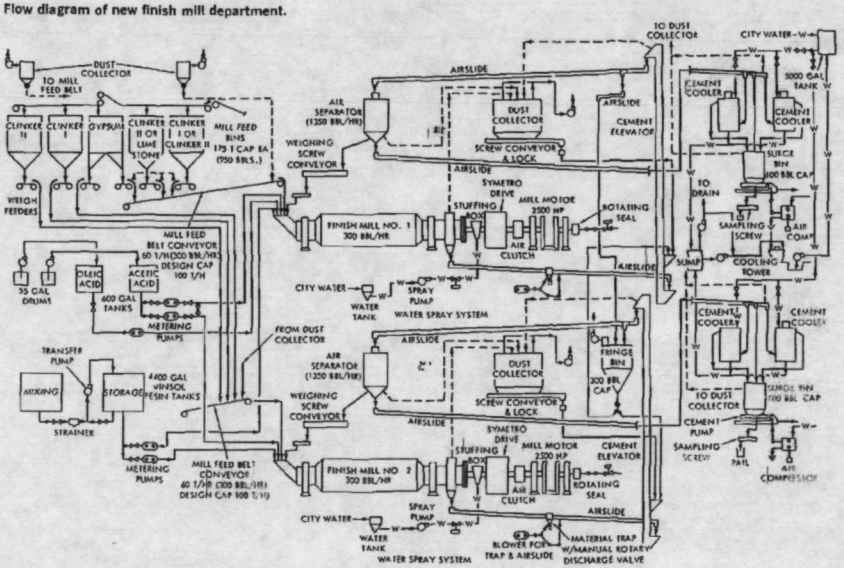


Plot plan showing new and existing systems.

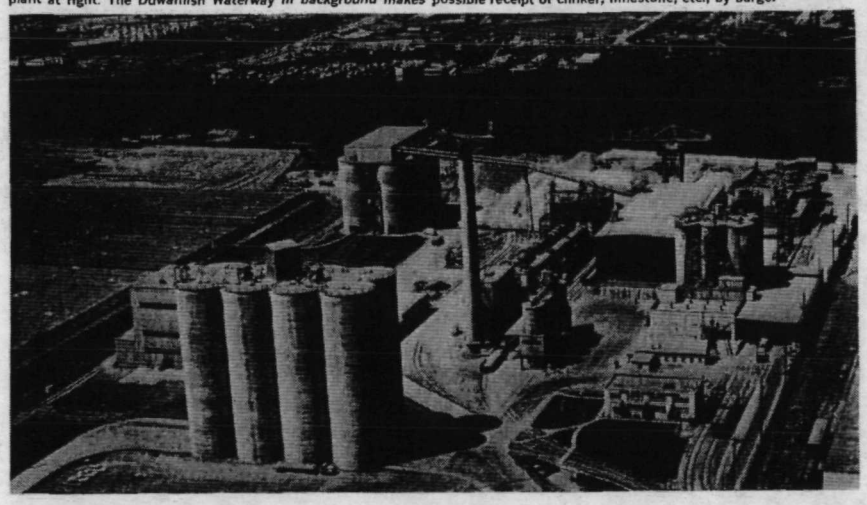
At the cement plant, the clinker is discharged at the rate of 1200 tph to a floating hopper and boom conveyor, to allow for tides. This conveyor is 36" wide, and discharges on shore to the first of two 36" conveyors to the top of the clinker storage silos. There are six 25,000-bbl. concrete silos, of which four are ordinarily used for the Lafarge clinker, and two for the plant clinker. The latter is carried on a separate conveyor from the old plant, and this conveyor is also used to feed gypsum from storage to two 2,000-ton interstices. There are high-level indicators for all eight bins, and Syntron feeders give accurate discharge control.

Withdrawal of the two clinkers and gypsum is under laboratory control. The operator makes the specified setting of controls, and this flow is automatically maintained. The three reclaiming belts discharge to the 24" x 485' main

Flow diagram of new finish mill department.



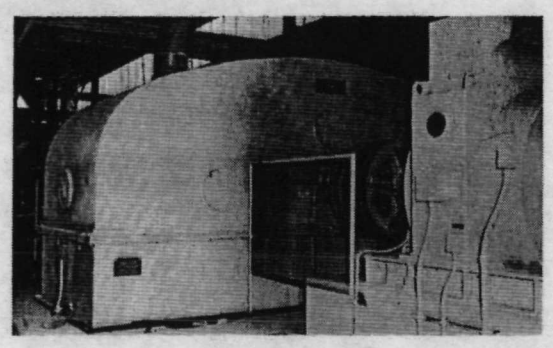
Aerial view of Lone Star's Seattle plant illustrates the manner in which the new facilities at left were fitted in with the older plant at right. The Duwamish Waterway in background makes possible receipt of clinker, limestone, etc., by barge.



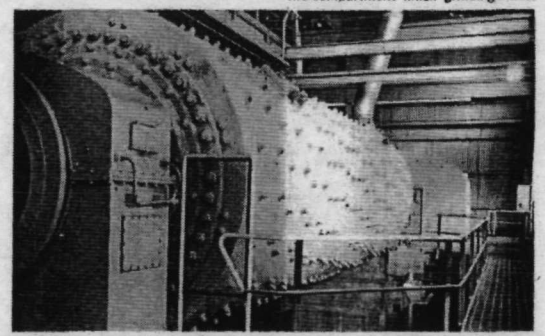
The new clinker storage silos with conveyor from new dock in foreground and one from older plant at left. New mill building is in background.

conveyor to the mill building, where a horizontal distributing belt with a tripper discharges to the required mill feed bin. There are two 900-bbl. feed bins for each of the two mills, and a common 200-ton gypsum bin. Cement can be made as desired either with all one clinker or the other, or any desired blend of both. Usually, they are used as required to keep in balance with supply. Each mill is entirely independent of the other as to feed and discharge.

ABC weigh belt feeders are used under all the five bins—two under a pants-leg chute under the gypsum bin—to feed clinker, limestone and gypsum in the desired proportions to the two 24″ mill-feed conveyors. These discharge into the feed spouts of the two 12′ x 34′ F. L. Smidth 2-compartment mills which have Smidth internal water-cooling systems and automatic pressure lubrication. Each mill is loaded with 330,000 lb. of steel grinding balls. In the first compartment, there are 115,000 lb. of 1½″, 2″, 2½″ and 3″ grinding balls; and, in the second compartment, there are 215,000 lb. of ¾″, ⅞″, 1″ and 1¼″. Each mill is driven by a 2,500-hp. General Electric synchronous motor—which has standard synchronous drive—through a Fawick air clutch and a Smidth Symetro gear drive. The mills are being driven at 17.23 rpm.



Below: One of the two new 12′ x 36′, two-compartment finish grinding mills.



Each mill is in closed circuit with an 18′ Raymond separator. The product is discharged to a Halliburton pneumatic conveyor to a Link-Belt bucket elevator and another conveyor which discharges into the separator. Tailings are returned by a 20″ screw conveyor to the feed end of the mill, and the product goes by air conveyor to one of the two pairs of 6½′ x 17½′ F. L. Smidth cement coolers. The separators are driven by 250-hp. motors, and the coolers by 50-hp. motors with air-cooled drives. Type I cement capacity is about 300 bbl./hr. with a fineness of 3400-3500 Blaine. Type III is about 150 bbl./hr. at 5600-5700 Blaine. Some special pipe cement is also made at 320 bbl./hr. and 3200 Blaine. Two types can be made at one time.

The total rate of feed to each mill is preset and is maintained by a master control system which was developed by Robert J. Jager, engineering consultant for the company, and which was first used at its Maryneal, Texas, plant. This involves a device for indirectly weighing the return tailings to the mill from the separator. The reject feed screw is mounted on three supports (load cells), so that any variation in the return rate is integrated with the new feed to achieve preset total feed. A separate ammeter is used as an indicator only. The output of the screw combines with the total feeder signals to the controller. Actually, a very uniform total flow is obtained, with parallel lines on the recorder. An advantage is that the response time is a matter of only a few seconds, and there is the added benefit of direct reading of the percentage of circulating load. With Type I cement this is about 100%, and with Type III it is about 400%.

The cement is discharged from each mill circuit to a 7″ Fuller-Kinyon pump which can feed either to a selected silo in the new group or to a transfer station from which another 7″ pump can feed to the old silos or packhouse.

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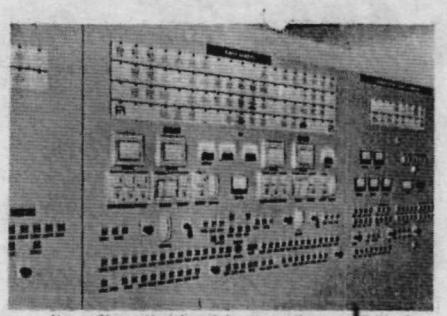
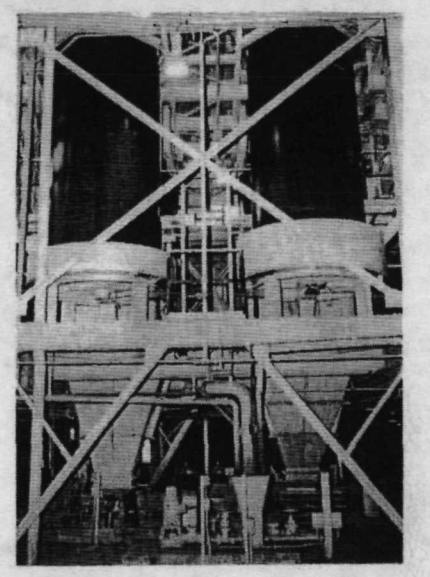
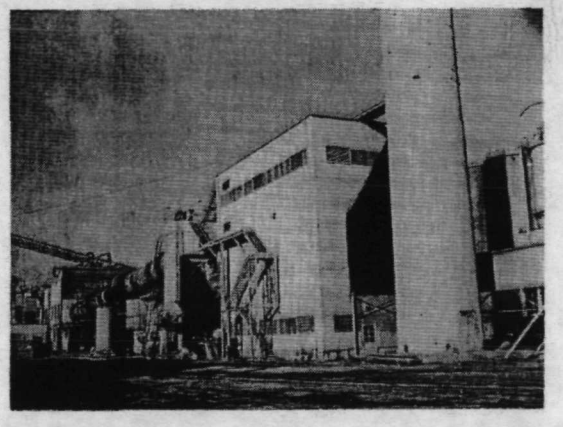


Above: The control board for the entire new clinker handling, storage and grinding system.

Opposite page, center: The 2500-hp. motor driving one of the mills, with air clutch and gear reducer.

At right: The two 6′6″ x 17′6″ cement coolers from which finished cement goes to 7″ pumps.





This view of the older plant shows the kilns and rotary coolers.

The new group consists of eight 25,000-bbl. silos, which are elevated to allow drive-through loading under both rows. On the truck side, loading is done by gravity or by air conveyors to flood-proof screws which feed to a 4′ x 8′ Productive Equipment Co. "Snico" 1-deck screen with ⅜" openings. This breaks up or removes lumps. The car loading side is identical, and both are dustless. The Howe truck scale has a capacity of 75 tons and a 110′ platform. The 200-ton Howe railroad scale also has a 110′ platform, and can, if necessary, also be used for truck loading, with the capability of being supplied from the far row of silos by cross air conveyors.

The new operation is controlled from four panels in a room in the mill building. Complete control of dust is obtained with 20 Sly bag-type collectors in the new section, and two Western Precipitation electrical precipitators and seven bag collectors in the old plant. There is also a Johnson-March spray system on the rock-handling system and in both departments on clinker handling up to storage, as well as an alternate system on clinker storage and feed.

All of the work done was designed by Lone Star engineers, including the formidable task of providing a firm foundation on the very unstable ground in this area. Everything is supported on prestressed concrete piles driven to solid bearing, except the cement silos, which are on a floating mat. This area was excavated 20 ft. deep to solid material and then backfilled. James Henson was project engineer for Lone Star, and Frank Embree was construction superintendent.

W. R. McClinton is plant manager; Frank McNamara is maintenance superintendent; Lloyd Fuller is quality supervisor; and Wayne Williamson is office supervisor. • • •

LONE STAR CEMENT CORPORATION